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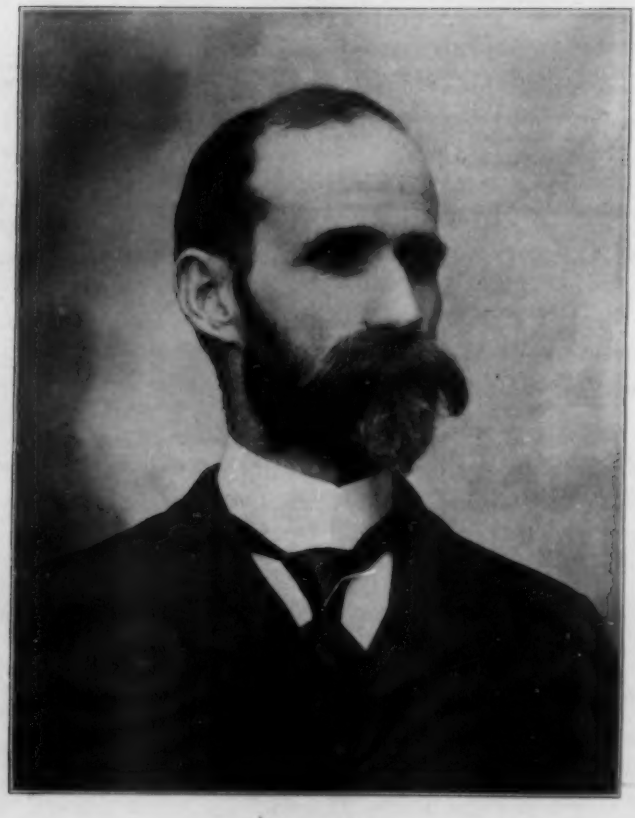


DR. T. PROCTOR HALL,

Secretary of the American Electro-Medical Society.

THE AMERICAN
X-RAY JOURNAL.
Devoted to Practical X-Ray Work and Allied Arts and Sciences.

VOL. XIII. CHICAGO, JULY, 1903. No. 1

Electro-Therapy.

A Course of Twenty-four Lessons under the auspices of the Chicago College of X-Ray and Electro-Therapeutics

LESSON 2.—WHAT IS ELECTRICITY?

In seeking an answer to this question, we leave the realm of facts and enter the domain of theory. A theory is useful when it assists us in understanding the facts that we already know and also when it assists in the discovery of new facts. A theory, then, may be very useful without being true, tho a true theory is, of course, the most useful of all.

As already stated, the earliest theories of electricity were based mainly upon electro-static phenomena, and assumed the existence of one or more ethereal fluids. These one-fluid and two-fluid theories have been of great use in the advancement of the science of electricity, tho they are now known not to be true.

In every useful theory there is more or less of implied truth. It is not true, as is assumed in the fluid theories, that an electric current is a flow of some fluid along the conductor; but it is true that there is a flow of energy along the conductor wherever an electric current exists. It is not true that an electric charge is an accumulation of a positive or negative fluid; but it is true that in an electric charge there is an accumulation of strain, of matter or ether, in which the potential energy of the electric charge resides. An electric discharge in gas, while it is not a flow of an ethereal fluid, consists largely of, or is, at any rate, accompanied by, a stream of material particles. It is thus seen that instead of having to be completely abandoned, fluid theories of electricity require only a reconstruction in order to fit fairly well the facts of electricity as they are now understood.

Numerous mathematical theories of electricity have been worked out from time to time, based upon more or less definite physical assumptions. While these theories are exceedingly useful in the development of the science, and in the case of electricity have actually preceded, in many instances, our knowledge of the physical nature of the phenomena to which they apply, it is unfortunately true that not more than one man among a million is capable of thinking clearly and easily in mathematical terms; consequently a theory, in order to be of general use, must be expressed in mechanical or, at any rate, physical terms.

The first distinct advance in this direction was made by James Clerk-Maxwell who was both mathematician and physicist. He showed that on the assumption that an electric charge upon a surface consists of an ethereal strain in and about that surface, it becomes possible to deduce mathematically the laws of these phenomena. Maxwell was unable to find a definite strain which would fulfill all the required conditions as a basis for his mathematical calculations. His views, in spite of this defect, were quickly adopted

by the leading physicists of the world, tho they made little headway among scientists in general until Hertz succeeded in producing experimentally electro-magnetic waves of the sort whose existence had been theoretically described by Maxwell.

Apart from his mathematical work, Maxwell's contribution to the theory of electricity consisted in showing that electro static phenomena can be explained by the assumption of a strain in the luminiferous ether. Previous to his time it had been fashionable to assume one ether in order to explain light, another to explain sound, another to explain magnetism, etc. In fact, everybody who had something to explain felt himself at liberty to invoke a new ether for that purpose. By showing that the phenomena of eletricity and of light could be reduced to a single theoretical basis, Maxwell established the luminiferous ether upon a firm foundation and gave the death blow to the numerous wild-cat ethers of mere speculators.

When the existence of electro-magnetic waves (ether waves) had been experimentally proved, attempts were made to explain all electrical phenomena upon this basis. Poynting's theory was of this class He supposed that an electric current in a wire was not in the wire at all, but consisted of a series of "stationary waves" in the di-electric surrounding the wire. This assumption rested upon the flimsiest kind of evidence, and gave rise to many more difficulties than it could possibly explain. The theory enjoyed a brief popularity and then died a natural death.

Additions in our knowledge of physical chemistry, and particularly investigations upon the dissociation of salts in solution, led to the development of the theory of ions; namely, that some molecules in solution became separated into two separate parts which are electrically charged. The one bearing a positive charge is called the positive ion or anion, the other a negative ion or kation. The electro motive force of a battery is derived from the tendency of oppositely charged ions to unite, and the force of union must be overcome before salts can be decomposed by an electric current or any other force.

"Start with the hypothesis that electricity is a persistent force which is a part of the atomic structure of matter, that this force is constant, and is the vital force so far as the seventy-odd elements now discovered are concerned, and each element is endowed at all times with a constant electrical pull. Its presence is made known to the senses by the attracting and repelling phenomena, each element bearing a definite relation with the others, in proportion to their electrical pull and rate of oscillation or harmonic condition (better known as the combining power). This constancy of electrical pull, which is the vital part of the elements associated with a definite rate of oscillation, gives to us the various forms of matter, known as compounds."—*Pratt.*]

The ionic theory explains satisfactorily most of the facts of electrolysis, as well as a great many other physical phenomena, and must be considered as at any rate very close to the truth. Attempts to apply the same theory to gases have been only partially successful, and when we come to consider solid conductors the theory seems to fail altogther. It is a theory which deals essentially with matter in a liquid form.

Dr. Pratt's view of an electric current is that every electromotive force causes the molecules to form themselves into closed magnetic chains wound spirally about the lines of electric force. It further causes an oscillation of the molecules which is transmitted as an impulsive push in the positive direction along the spiral chains, and as a pull in the negative direction along these chains.

For a long time mathematicians have

known and made use of the analogy which exists between an electric current and a vortex ring. Some years ago the Vortex theory of electricity and magnetism was developed by T. P. Hall upon a mechanical as well as mathematical basis. According to this theory an electric current is a vortex ring, consisting of a bundle of closed chains (not spirals) of polarized atoms which are lying parallel and rotating in the same direction with great velocity. Each atom or molecule behaves as a magnet, taking hold of its fellow as soon as the electro-motive force is applied, and forming a complete chain or circuit. All the atoms in a single chain rotate with the same speed. If the atoms at any part of the chain are held so as to prevent rotation, none can rotate, and there is a polarized condition, but no current.

There are two possible directions of rotation, right handed or positive and left handed or negative. Any particular rotation, however, is right handed looking in one direction, and left handed looking in the opposite direction; so that every electric current is both positive and negative according to the point of view. A conductor is a substance which allows the rotation of these chains of atoms to take place.

In a nonconductor the atoms are so held in connection with their fellows that they can rotate only a little way; remaining in this strained condition so long as the original twisting force (electro motive force) is acting, and returning to their usual condition when this force is removed. The twisting strain produced by a positive current is called a positive charge, and may in turn give rise to a positive current. A left handed twist, produced by a negative current, is a negative charge, and may give rise to a negative current. Thus there can be two, and only two, kinds of electric charges as well as of electric currents.

About each electric current there is produced by the rotation of the atomic chains a shearing strain in the dielectric. This shearing strain is the source of magnetism.

An alternating current produces in the surrounding region alternating strains which, passing outward from the wire, constitute polarized ether waves of the kind produced by Hertz. An ether wave such as would be produced from the end of a conductor subject to an alternating electromotive force is a cylindrical wave, and answers the requirements of a wave of ordinary light.

A permanent magnet is a piece of steel thru whose interior the ether has been pushed slightly from the south end toward the north end, returning on the outside in the direction of the well known lines of force.

This theory explains the attractions and repulsions existing between electric charges, electric currents and magnets, and shows clearly the relation between these and electromagnetic waves. It is entirely satisfactory as an explanation of electric currents and charges.

Electric discharges thru gases during the last thirty years have received a great deal of attention. Sir William Crookes' theory that the discharge in a very high vacuum (the kathode stream) is a stream of gaseous particles from the kathode, is all but universally accepted. J. J. Thompson's research upon the kathode stream led him to suspect that he was dealing with particles of matter very much smaller than atoms, and calculations made it probable that each one of these particles has about 1/700 part of the mass of an atom of hydrogen. He found further that the mass of the particles composing the kathode stream was independent of the nature of the gas from which they were derived. These researches, along with those of a considerable number of other physicists, have led to the Electron theory, namely,

that atoms are composed of a large number of excessively minute electrons, some of which are positive and some negative. Each electron is, or is indissolubly associated with, a minute electric charge. Under certain conditions negative electrons are discharged from the atoms, leaving the latter positively charged. The negative electrons constitute the kathode stream in a Crookes tube; they fly from a negatively charged metal in air; they constitute the material part of the radiations from radium and similar metals; and have the power of penetrating thin layers of metallic substances. One atom of hydrogen contains about 700 of these electrons. Calculations made upon several distinct lines show that the diameter of an electron is in the vicinity of one-millionth part of the diameter of an atom. Waves of light, which are known to be so short that they could not originate from the motion of atoms as a whole, are now supposed to arise from the oscillations of these electrons or bundles of electrons in the atom. So far, investigators have found only negative electrons. Whether the positive electrons are equally small, or whether the part of the atom which remains when one or more negative electrons have escaped from it constitutes the positive electron, it is too early to say.

The electron theory is so recent that it is difficult to say definitely what phenomena can be satisfactorily explained by it and what must be referred to other causes; but we are reasonably safe in saying that the theory has such broad and deep foundations that it has come to stay, and forms a valuable addition to our knowledge of electric phenomena.

The word "electricity" which Gilbert used to express the unknown cause of the forces of attraction and repulsion which he observed, can hardly be defined in the present state of our knowledge. The word is now usually restricted to the cause of electro-static phenomena, and with this meaning may be defined as an ether strain.

All attempts to identify electricity and matter are puerile. Electricity is a form of potential energy. Electric currents are a form of kinetic energy. And tho matter and energy are intimately and perhaps eternally associated, they are essentially distinct and incommutable.

The things which exist in the universe and whose existence is absolutely independent of human power are (1) Time, (2) Space, (3) Matter and Ether, (4) Energy, (5) Spirit, or whatever other name may be applied to the basis of consciousness. The physical scientist knows that the first four of these are eternal and indestructible. Of the last we have not the same knowledge, tho analogy leads to it being classed with the others.

Chicago Electro-Medical Society.

The June meeting was an informal banquet held in the Pullman building at 6 p. m., June 29. The president, Dr. Pettyjohn, in the chair. The business meeting was adjourned to 1208 Masonic temple, July 13, at 8 p. m. At the close of the banquet Dr. F. A. Leusman addressed the meeting as follows:

Electrical Illumination as Applied to Urethral and Vesical Disease.

F. A. LEUSMAN, M. D.

Professor of Genito-Urinary Diseases in the Chicago College of X-Ray and Electro-Therapeutics.

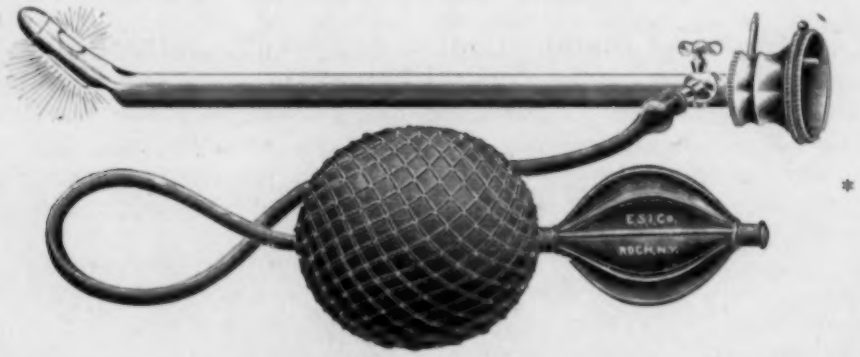
The urethroscope and cystoscope have become relatively popular instruments ever since the introduction into this field of an efficient and cool incandescent lamp. The latter did away with the very cumbersome cooling apparatus hitherto necessary. Each apparatus, especially the cystoscope, is still in the midst of a revolutionary progress, and has as yet not reached a stage of temporary perfection, like, for instance, that of the bicycle. And there are many reasons why urethroscopical and cystoscopical evolution must travel slowly. First and foremost, perhaps, we have the fact that the occasions loudly calling for the employment of these instruments are, on the whole, somewhat limited; then, the primary outlay necessary for their acquisition is not exactly small; their use calls for good judgment and experience in order to furnish satisfactory results and prevent harm to the patient. And again, it is a time-consuming process, much more so than either laryngeal or ophthalmological investigation. And worst of all, when most wanted, anatomical or pathological conditions frequently forbid their application.

The urethroscope is of use only after a urethritis has become chronic and if the meatus admits a caliber F. 24 or F. 26. A smaller calibered tube does not distend the urethral folds sufficiently for either inspection or treatment. Indeed, it is my rule to cut the meatus to F. 30 in obstinate cases requiring urethroscopical treatment. A straight urethroscopical tube introduced as far as the anterior layer of the triangular ligament and then gently and slowly withdrawn will give to the experienced eye a clearer demonstration of its physiological or pathological temper than any other device, reasoning inductive or deductive included. We simply see just how matters stand; we observe the color and luster of the mucosa, its vascularity, the presence or absence of hemorrhage or catarrhal conditions, as excess of mucous and leucocytes (pus). We notice the blanching of strictured parts; we recognize granular areas by their color and tendency to bleed; we see, if present, pin-head dilatations of Morgagni's sinuses; a papilloma could not escape our attention. In fact, in almost all cases we are enabled to make an approximately correct diagnosis. Thus we are enabled to apply equally correct treatment. We have a chance to watch the effects of treatment locally applied from time to time. While there is no particular difficulty attending the introduction of a straight urethroscopical tube into the membranous and prostatic urethra, it is always somewhat painful to the patient, and especially so in cases of posterior inflammation. A curved tube with a window on its posterior aspect seems here preferable, exposing, as it does, the caput gallinaginis, while at the same time its blunt tip prevents the es-

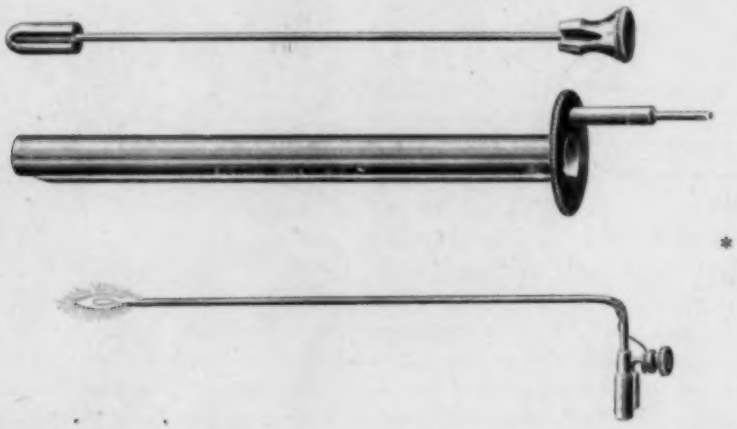
caping urine from above exposing the field and decomposing our solutions.

The main benefits, then, derived from the urethroscope, are: Dilatation, treatment localized to areas needing it, and ocular inspection of progress.

As to the cystoscope, it might be said that the water-distending one is for all purposes of examination the least painful to use; besides giving a good view of the conditions present within the bladder. In cases of hemorrhage we have recourse to



an irrigating or the Preston air-distending cystoscope. The cystoscope will show the condition of the vesical mucosa, vesical neck, the urethral openings, enlarging prostatic lobes, foreign bodies, sacculations, stones, ulcers, tumors, etc., etc. It must be added that to always correctly interpret what is seen requires experience.



After litholapaxy the cystoscope has shown the presence of fragments that the evacuator had failed to wash out.

A clinical trial will convince any one taking the trouble, what a beautiful view electrical illumination gives of the vesical interior. Nitze's Atlas and Fenwick's pictures show that the interior of the bladder can be very successfully photographed. Kutner (Berlin) has recently devised a cystoscope to which a lateral arm with proper lenses is fitted, enabling teacher and pupil to view the same spot at the same time, for didactic purposes.

In conclusion I wish to say that the main requirements for urethroscopy and

* Loaned by the Electro-Surgical Instrument Co., Rochester, N. Y.

cystoscopy are ownership of or access to the instruments, material, and the necessary energy required to approximate material and instruments.

Urethral catheterization is perhaps in more than half of the cases, at least of the bilateral, not always possible. Besides there is an added element of danger of carrying infection in close neighborhood to the kidneys. There is in many cases after catheterization of the ureters a temporary fever curve. Altogether it is clearly seen and must be admitted that while urethroscopy and cystoscopy are relatively easy of execution and of no harmful consequences to the patient, the opposite obtains in urethral catheterization, which frequently fails even when in the hands of the expert and is not altogether always a harmless procedure. In many cases, however, it has proved its value as a brilliant diagnostic measure. It has also been successfully applied for irrigating the renal pelvis. Nitze, Kolischer and others have devised operation-cystoscopes that admit of the removal of ligatures, papillomas, cauterization of ulcers, etc., an absolutely harmless procedure in skilled hands that thus frequently saves patients from the cutting operations. Cystotomy has a high mortality rate.

An interesting discussion followed, in which the following took part: Dr. Clark, Dr. Montgomery, Dr. Donaldson, Dr. Ruth M. Hall, Dr. H. P. Pratt. Remedies for abnormal conditions of the bladder and urethra were discussed at some length. It was pointed out that hemorrhagic condition of the bladder can be quickly overcome by using a sound with an insulated tip as a positive electrode within the bladder which has previously been filled with a normal salt solution. Similar treatment with the negative electrode is valuable in overcoming atropic conditions of the bladder. In each case the remaining electrode is connected with a large moist pad upon the abdomen. When pus is present, washing the bladder with one to three per cent of lysol was highly recommended.

The next regular meeting of the society will be held in September.

A mummy which Mr. John Brigg, M. P., presented last year to the Keighley Borough Museum has been examined by means of the Röntgen rays. Within the wrappings of an Egyptian mummy are frequently found scarabs or trinkets, or "passage money," which rummagers of the old tombs traffic in. In this instance the mummy, in its case, was removed into a darkened room, and the x-rays were applied from beneath. All the details of the anatomy became visible through their linen and wooden coverings, and no foreign body could be perceived. Two or three of the toes of one foot were wanting, but the rest was perfect.—*Health.*

X-Ray and its Adjunct Treatment.

DR. H. VALENTINE KNAGGS, LONDON, ENGLAND.

In the x-ray treatment of tuberculosis and malignant diseases the cure can, in my opinion, be greatly expedited by a judicious inclusion of other methods. In tuberculous lesions we find a disease produced by the action of a bacillus, so that if the raying is supplemented by further measures which have for their object the elimination of the microbe and a general purification of the tainted tissues, the progress of the case will be more rapid.

Dr. Pratt has shown that the destructive action of the rays in lupus has the effect of throwing toxins and other effete matter into the circulation, and that our treatment should be directed towards removing these impurities. In addition to the hygienic and dietetic measures now in vogue against tuberculosis, the cutaneous, renal and alvine excretions should be encouraged in every possible way. Medicinally an embrocation of guaiacol in almond oil should be rubbed into the sound skin in the vicinity of the lesion and large doses of either sulfid of calcium or guaiacol-eucalyptol-iodoform perles freely ordered.

From an electro-therapeutic point of view I believe that the x-ray treatment can be made much more effective if the high frequency brush is applied to the parts affected for ten minutes after the x-ray has been used, or the high frequency medication can be administered in any other suitable way.

These supplementary means of treatment also apply with even greater force to the more deeply seated tuberculous lesions. In a bad case of tuberculous ulceration in a boy of 13, after failure of tuberculin and other approved remedies, a complete cure was apparently brot about by means of the periodical use of the high frequency currents applied locally and generally, combined with the free use of guaiacol embrocation and the administration of 15 grains of sulfid of calcium daily.

With regard to malignant growths, I look upon cancer as a parasyphilitic disease (i. e., it is syphilitic in origin, but not in nature) and should rank it among the same category as such inveterate diseases as locomotor ataxia and general paralysis of the insane. The great spread of immorality in our large towns and the universal practice of vaccination (the lymph derived from cowpox resembles in its symptoms syphilis more than it does smallpox) would amply account for the increasing prevalence of malignant disease.

In the treatment of cancer, I have found that electrical medication, whether by x-ray or by high-frequency currents, can be made much more effective by the judicious use of skin-penetrating antiseptics such as guaiacol or eucalyptol. I have also observed that the treatment was greatly aided by the use of light-heat baths, a diet free from all salted or tainted foods, and the use of large doses of sulfid of calcium. I successfully treated one case of rodent ulcer affecting the inner canthus of the eye, solely by the use of large doses of the sulfid salt combined with Dowsing baths. I treated another case of advanced cancer of the cervix with the portable Turkish bath which the patient purchased and used at home. This was used at intervals in conjunction with sulfid of calcium, careful dieting, and plenty of fresh air. This patient was an elderly woman in reduced circumstances and of intemperate habits. The improvement at first was remarkable. She got

about again after being bed ridden, and appeared to be fast recovering. The local lesion also improved. The patient appeared to continue to progress for some months, but after a time she neglected the treatment, had a severe relapse with hemorrhage, and from this she died.

In concluding these rough notes I would like to add that I believe the high frequency currents will be found of quite as great value as the x-ray in the treatment of tuberculous and malignant lesions, and that the time will shortly come when it will be possible to decide by the symptoms and general condition of the patient as to whether the x-rays or the high frequency should be used separately or both together. I also trust my American confreres will try collateral treatment in the many cases of inveterate disease which come under their care for electrical treatment, and report their results.

National Eclectic Medical Association.

As an indication of the amount of interest now taken in electro-therapeutics, attention is called to the following list of papers upon that subject read at the 33rd annual meeting of the National Eclectic Medical Association held in Indianapolis last June:

Static Electricity in Diseases of the Eye, Z. L. Baldwin, M. D., Niles, Mich.

Electrical Treatment of Rectal Strictures, H. J. Berkinhamer, M. D., New York.

How I Use Electricity in My Office, G. R. Shafer, M. D., Peoria, Ill.

Electrical Treatment of Urethral Stricture, G. W. Boskowitz, M. D., New York.

Mercuric Kataphoresis, Wm. L. Heeve, M. D., Brooklyn, N. Y.

Electricity in Eye Diseases, Alfred W. Herzog, M. D., New York.

The Therapeutic Use and Abuse of Electricity, M. B. Pearlstine, M. D., New York.

A paper by W. J. Krausi, M. D., New York.

X-Ray Therapeutics, H. P. Pratt, M. D., Chicago.

Why Eclectic Physicians Do Not Need to Use Electricity, M. B. Morey, M. D., Gonzales, Texas.

Electricity in Strictures, N. L. Allen, M. D., Boston.

The Electrical Treatment of Functional Irregularities of the Female Generative Organs, D. M. Browder, M. D.

The Practical Application of Static Electricity, H. E. Truax, M. D., Atlanta, Georgia.

The Difference Between the Galvanic and Faradic Currents as to Origin and Use, J. R. Spencer, M. D., Cincinnati, Ohio.

Dr. Spencer's paper on The Difference Between the Galvanic and Faradic Currents, described the apparatus used in the production of each of these, and explained their physiologic and therapeutic action. He also gave a brief historic account of the discovery and development of these currents.

Ultra-Violet Ray Therapy, High Frequency Currents and Coils, and Vacuum Electrodes.

This is the subject of a brief lecture by Dr. H. C. Bennett, Lima, Ohio, published in the *Electro-Therapeutist*, April 1, 1903, describing in detail his method of producing ultra violet rays and high frequency currents.

Editorial.

Dangers of X-Rays.

X-ray treatment has been found to be useful in such an exceedingly large number of abnormal conditions that it is being applied by many physicians who know very little about its proper regulation and who are not sufficiently familiar with the practical uses of electricity to be able to foresee the probable results of their treatment. This condition has been inevitable, since until recently the subject has not been adequately provided for in medical colleges, and it has been and is difficult for the general practitioner without a very considerable expenditure of time and money to obtain practical acquaintance with x-ray therapeutics.

On the other hand, there has been a number of electricians who were unacquainted with medical science, but who found their income could be considerably increased by giving x-ray treatments. In most States this has been declared to be in contravention of the medical law, but this objection has been overcome by the electrician professing not to give treatments, but to make only fluoroscopic and radiographic examinations. The effect of the x-rays upon the body is of course uninfluenced by the presence or absence of a fluoroscope or a photographic plate, and such proceedure by non-medical persons is a violation of the spirit, and in most cases of the letter also, of medical law. The law provides that medical practitioners should have a certain minimum amount of knowledge of the conditions of the human body in health and diseases, and of the effect of ordinary therapeutic agents. The fact that an electrician is familiar with the x-rays does not entitle him to use these in the treatment of human ailments, unless he is qualified by the requisite knowledge of medical science. Ignorance of general therapeutics on the part of the one giving treatment is quite as dangerous to the patient as ignorance of the nature of x-rays, and the unlicensed practitioner who gives x-ray treatment has much less at stake personally than the licensed practitioner. Tho there are exceptions in individual cases, it is generally true that the one who has only the special knowledge is much more liable to do harm than the one who has general knowledge of therapeutics without a special knowledge of x-rays. The attention of State boards should be strongly directed to this class of unlicensed medical practice.

American Electro-Medical Society.

The first annual meeting of the American Electro-Medical Society will be in conjunction with the meeting of the Illinois State Electro-Medical Society in the Masonic Temple, Chicago, about the first of November. Arrangements are being made for an excellent program by representative men, and for an exhibit of electro-therapeutical apparatus.

The Ubiquitous X-Ray.—Swallowing is no longer an effective method of hiding stolen property. At the Japanese Mint employés suspected of swallowing small coins are now placed under the x-rays and the coins have been discovered in this way in the stomachs of guilty persons.

The interior of a gold-bearing rock was inspected in an Oregon town by means of the Röntgen rays, and veins of gold were as plainly visible as if they were on the surface.—*Health.*

Electro-Physics.

The Electrolytic Rectifier.—It is well known that if an alternating current is sent through an electrolytic cell having a carbon and an aluminum electrode immersed in a solution of alum, the current in one direction is almost completely stopped, while it passes freely in the opposite direction. It is when the aluminium is the anode that the current is stopped, and from this it appears that, under these circumstances, some film is formed on the surface of the aluminum plate which prevents the negative ions from reaching the metal. It is generally believed that the obstruction is due to a film of aluminium oxide formed on the surface of the plate, but Mr. K. E. Guthe (*Phy. Rev.*, December, 1902) urges that this view is untenable, and gives good reasons for the hypothesis that the resistance to the passage of the negative ions is due to the formation of a gaseous layer of oxygen, which becomes entangled in the partial layer of oxide on the surface of the aluminium plate. He shows that a layer of hydrogen is not entangled in this way, and therefore it opposes no resistance to the ions when the aluminium plate is a kathode. A rise of temperature was found to reduce the resistance of the film of oxygen, as might be expected from theory. The composition of the electrolyte did not affect the result as long as the negative ion was oxygen, but when an electrolyte with chlorin as negative ion was used the cell lost its rectifying property. Guthe also replaced the aluminium electrode by a semi-permeable membrane of copper ferrocyanid, and found that the results corresponded closely with those obtained with the aluminium cell. It appears to follow from Guthe's experiments that the condition for the formation of an electrolytic rectifier is an electrode with a surface which will retain one of the gaseous films produced by electrolysis.—*London Electrical Review*, May 2, 1903.

The Electron Theory.

A concise summary of this theory is given editorially in the *Electrical World and Engineer*, Feb. 2, 1903. The hydrogen atom is supposed to consist of about 700 electrons. An electron may be either positive or negative; as yet we have definite knowledge of negative electrons only. All negative electrons are found to be of the same size, no matter what kind of atom they come from, consequently the number of electrons contained in any atom is found approximately by multiplying its atomic weight by 700. An atom of mercury, for example, contains 200×700, or 140,000 electrons. The diameter of an atom of hydrogen being about one-tenth of a bikron (one ten-millionth of a millimeter), the electrons might be supposed to be crowded, but it is calculated that they are as distant from one another relatively to their size as are the planets in the solar system. Lodge calculated that if an atom be represented by a sphere 100 feet in diameter an electron will be represented by a period mark upon this page. Chemical affinity is traced to aggregation of electrons which are unbalanced positively or negatively. Kathode rays are regarded as streams of electrons. Roentgen rays are solitary waves of radiant energy caused by the impact of negative electrons with solid matter.

Development of the Electron Idea.

W. Kaufmann traces the stages by which modern electricians have arrived at the electron theory. The authorized translation of his paper is given in full in the *Electric World and Enquirer*, April 18, 1903 to which the reader is referred for details

Electrolysis of Alkali Salt Vapors.—Wilson (*Phila. Mag.*, August) gives an account of an experimental investigation of the passage of electricity through flames containing salt vapors. Former experiments have shown conclusively that conduction thru salt-vapors is accomplished by means of ions of some kind and is, therefore, to this extent at least analogous to conductions thru solutions. The experiments described in the present paper show conclusively that above 1,300° C. there is a very close analogy between salt vapors and liquid electrolytes; Faraday's laws of electrolysis are strictly applicable to salt vapors, just as to salt solutions. He shows that a salt in a state of vapor gives rise to the same number of ions carrying the same charges as a salt in an aqueous solution. He describes in detail the arrangement of his experiments, and gives in a diagram curves showing how the current with a constant e. m. f. (840 volts) varies with the temperature when solutions of one gram in a litre are sprayed. The nearly constant value of the current above 1,300 degrees seems to represent the maximum current which the amount of salt passing thru the tube can carry, for it is affected very little by increasing either the temperature or e. m. f. This current he calls the "saturation" current for the particular salt used. The values of this maximum current are given for various salts in a table. From this table he proves that Faraday's laws of electrolysis apply also to the saturation current carried by a salt vapor. The amount of salt per second of electrochemical equivalent unity which would correspond to a current of 1 ampere is 0.0101 milligram. Now, 1 ampere-second liberates in electrolysis 0.0104 milligram of hydrogen, so that it appears that the factor of proportionality is nearly the same for salt vapors as for electrolytes.—*Electrical World and Engineer*, Sept. 13, 1902.

Electric Currents in Plants.—The results of some interesting researches on plant electricity have been reported by A. D. Waller, says the *Revue Scientifique*. He finds that whenever a plant is wounded, a positive electric current is established between the wounded part and the intact parts. This may start with an electromotive force of 0.1 volt, but it afterward diminishes. He writes further:

"Actual wounding is not necessary to obtain this manifestation; an electropositive current is set up when there is mechanical excitation, but it is much weaker (0.02 volt). And light acts like mechanical excitation with certain plants, such as the leaves of the iris, of tobacco, of the begonia, etc. From the illuminated to the darkened part flows a positive electric current that may be as strong as 0.02 volt. A similar reaction in the petals is not always observed. There is a certain correlation between the vigor of a plant and the electric reaction. The more vigorous the plant is, the stronger the current. Plants grown from fresh seeds give a more powerful current than those from old seeds. A bean a year old gave a current of 0.0170 volt; one five years old, a current of 0.0014; and the reaction is inversely and regularly proportional to the age of the seed from which the plant springs. There is observed in vegetable tissues subjected to an excitation of the same intensity at regular intervals the characteristic changes of reaction that are present in animal tissue—fatigue, recuperation, etc. Temperature plays a part in all these phenomena; below — 4° to — 6° C. [+ 22° to + 25° F.] and above 40° C. [108° F.] there is no reaction. As we see, Mr. Waller has demonstrated some interesting facts, and doubtless he will pursue and extend his investigations."—*The Literary Digest.*

Transmitting Pictures by Electricity.—Herr von St. Schneider is the originator of a new system for the electrical transmission of pictures. His system makes use of the Pollak-Virag rapid telegraph recorder and a selenium cell for effecting the necessary variations in intensity of illuminations. At each station two telephone receivers are connected to a small mirror so as to vibrate this in two directions. Corresponding telephone receivers are connected together, and within each circuit is placed a revolving contact maker. One of these contact makers makes and breaks the circuit a certain number of times for each revolution, and this, of course, sets up corresponding vibrations of the two telephone receivers in that line. The other breaker does not actually break the circuit, but introduces a gradually increasing resistance, starting at zero and rising to a maximum, and then dropping to zero again. The effect of this is to produce a comparatively slow motion of the two telephone diaphragms connected in that circuit. When these two contact makers, which are connected to the same shaft, are revolved, a beam of light, reflected from a suitable source upon a screen, will travel gradually over the entire screen; starting at one end, working its way back and forth to the other, and then jumping to the first point again. The method of transmitting is this: A beam of light from an arc lamp is allowed to fall on the mirror at the sending station. By a suitable grouping of lenses, the beam is thrown horizontally through a photographic negative, and is then focused on a selenium cell. The effect of this will be to vary the current in the circuit containing this cell, corresponding to the intensity of the light falling upon it. The circuit from this cell is carried to the receiving station, and there the current is superimposed upon the current flowing through an electric arc. One ray from this arc is thrown upon the receiving mirror. The intensity of this ray varies with that falling upon the selenium cell; and since the ray traces a path on a receiving screen similar to that which the sending ray follows, the result is a production of a copy of the photograph at the receiving station. It is, of course, necessary that the image be repeated at least ten times a second to give a constant effect upon the retina.—*Electrical Age*, April, 1903.

Ionization by Ionic Shock.—STARK—(*Ann. d. Phys.*, No. 8; abstracted in Lond. *Elec.*, August 8) gives a theoretical discussion of the work of several investigations of the current in a gas and its dependence upon the e. m. f. His theory of ionization by ionic shock maintains that, in ionized gas, the current at first increases with the e, m, f, until all the ions generated in the gas, whether by Roentgen rays, violet light or other artificial means, are used up by the current as fast as they are generated. When this is the case, an increase of e. m. f. does not produce any further increase of current. But on further increasing the e. m. f. a point is reached at which the ions, traversing their mean free path, acquire a sufficient velocity to ionize neutral molecules by their impact. The current then becomes "independent" and rises again with increased e. m. f. The curve with the e. m. f., as abscissa, and the current, as ordinate, has, therefore, an ascending branch, a horizontal portion, and another ascending branch. Such curves may be obtained from the data provided by several investigators. In some cases the curves are not complete, as the point at which the independent current sets in depends upon the pressure, temperature and imparted ionization of the gas. "The positive ionizing potential is about 240 volts in air, with an aluminum electrode, and 270 volts with a copper electrode."—*Electrical World and Engineer*. September 13, 1903.

Is Nerve Energy Electricity?

Dr. J. E. O'Brien (*Jour. A. M. A.*, March 7, 1903) urges the identity of these two forms of energy. He points out the similarity between the structures of nerves and of insulated electric conductors, and considers the estimates that have been made of the velocity of nerve impulse open to criticism. His arguments are (1) electricity is always present when nerves act; (2) electricity would do the work required with such construction as we find in the nerves; (3) electricity is the only force we know that would do this work; (4) the analogy of the central communicating and terminal mechanism of the nervous system with those of electrical systems.

Disassociation of Electrolytes.— Liebenow (*Ziet. f. Elektrochemie*, December 25) in a theoretical article discusses the reasons why Ostwald's well known formula for the electrolytic conductivity as a function of the concentration, does not agree with the facts in the case of the highly ionized solutions of ordinary inorganic salts and acids. He develops a new formula which is more general than Ostwald's, as it contains two empirical constants, while Ostwald's contains only one. In the case of potassium chlorid the formula is shown to be a good representation of the change of conductivity over a wide range of concentration.—*Electrical World and Engineer*, Feb. 21, 1903.

Abnormal Kathode Fall.— Stark (*Ber. Deut. Phys. Ges.*, November 1) gives an account of a theoretical and experimental investigation of the abnormal kathode fall in vacuum tubes. According to the ionic shock theory, the amount of ionization near the kathode depends essentially upon the number of neutral molecules in the unit of volume. This number, called the "specific number of molecules," is of importance in a number of formulas governing vacuum phenomena, and the author proposes to use it for formulating the abnormal kathode fall of the glow current. If that is done, it appears that theoretically the relation between kathode drop and current should not be linear. Since a linear relation has been, however, found by some observers, he made new measurements with platinum electrodes in a vacuum "free from fat." The uniform result is that there is no linear relation between kathode fall and current strength. The fact is that the self-heating of the kathode often simulates a linear relation. The electric work in the dark kathode space is equal to the product of the kathode fall into the total current. The work spent on the positive ions is converted into heat at the kathode. With a constant pressure, and an increasing temperature, the normal kathode fall remains constant, but the abnormal kathode fall increases while the normal current density at the kathode diminishes.—*Electrical World and Engineer.*

The Aurora Borealis.—From careful observations on the aurora borealis, Professor Paulsen has arrived at the conclusion that the spectrum of the light given is identical with the "kathodic" spectrum of nitrogen. This point is of interest in connection with the latest theory of the origin of this remarkable phenomenon, which attributes it to a stream of the Thomson corpuscles emitted from the sun. As these approach the magnetic field of the earth they are deflected toward the poles, and when they finally reach a level at which the air is of the proper density, they give rise to light phenomena similar to those obtained with cathode rays in suitable vacuum tubes.—*London Electr. Rev.*

Electro-Diagnosis.

The Anatomy of the Skull Stereoscopically Demonstrated by the X-Rays.—At the Royal Academy of Medicine in Ireland, Dr. W. S. Houghton pointed out that the difficulty of interpreting a single skiagram arose from several causes. The x-ray picture was an example of uniplanar projection of multiplanar objects. This caused superposition of shadows. Then the fact that the x-rays formed a diverging cone caused magnification and obliquity distortions. These sources of inaccuracy in the "single picture" were eliminated by the beautiful stereoscopic method of Roentgen photography of Mr. Mackenzie Davidson. By this method a reproduction of the skull could be obtained, perfect in contour and perspective. Dr. Houghton showed by diagrams how all sources of inaccuracy were eliminated in the stereoscopic method and afterwards in the reflecting stereoscope showed prints of the base of the skull and lateral views in which general points were well demonstrated, including the relations of the groove for the lateral sinus to the mastoid air cells, the mastoid emissary vein, the internal auditory meatus, the external auditory meatus, the cochlea, the semicircular canals, the canal for the internal carotid artery, and the foramina in the base of the skull.—*Jour. Am. Med. Association.* April 4, 1903.

The Prebacillary Stage of Pulmonary Tuberculosis.

Dr. J. M. Anders, Philadelphia, (*Jour. A. M. A.*, January 12, 1901) said that among the most valuable agencies for the early diagnosis of pulmonary tuberculosis are the Roentgen rays.

"No matter which of the numerous phases this common affection may assume at the onset, certain crucial tests should not be overlooked. I refer particularly to the systematic and persistent use of the clinical thermometer, the tuberculin test and the use of the Roentgen rays—one or all.

"In phthisis the radioscopic appearances are usually observed in the subapical regions, and they sometimes show the presence of tuberculosis infiltration and consolidated areas before either the physical signs are obvious or the microscopic slide demonstrates the tubercle bacilli in the sputum. It is doubtless true that reliable knowledge from the use of the Roentgen rays and fluoroscope is possible only to an expert or an experienced observer. Again, the value of this means of recognizing pulmonary tuberculosis in its first stage would be greatly increased, if the images shown by the fluoroscope could be satisfactorily photographed in all cases. Francis H. Williams states that he has discovered radioscopic evidences of consolidation before physical signs of such change were present; also that he has found indications of the existence of tuberculosis when this disease had not been suspected previously. Stubbert has also reported one or two instances in which slight haziness has been observed in spots which at the time showed no other physical signs of disease, but where they subsequently developed."

Improved Roentgen Technique.

Wiesner, of Vienna, proposes to make exposures thru a round hole in the center of a lead coated board. A metal cylinder passes thru the hole and is lowered to touch the skin. By this means he says only parallel rays are admitted and no scattering of the rays occurs. This is simply a cumbersome apparatus for replacing the well known lead box.

X-Light in Anthropometrical Signalment.—William Rollins says, in the *Boston Medical and Surgical Journal*, May 7, 1903, that any procedure which makes the measurement of criminals more exact must be valuable. Such a one is that of making x-light photographs of the bones. He estimates that this method at least doubles the accuracy with which measures of the hand can be taken, and by enabling other measures of the feet, besides the length to be taken it allows at least four times as many persons to be identified as at present, though the real number will be found to be much greater. In cases of bodies burned or decomposed before they are discovered, the method would have some advantages over any that has been proposed. In other cases when only some of the parts of the body are found, as for example, a hand or a foot, the method alone might lead to identification. The author has designed and constructed apparatus for conducting these x-light photographic anthropometric signalments.—*Medical Record.*

Radiography in Biliary Lithiasis — Dr. Gasteln and Dr. Yogue, of Madrid, had radiographed a large number of cases, subsequently submitting their finding to the control of operation or autopsy. Radiography does not permit of the differentiation between stones in the gall-bladder, and dense pericystic adhesions, and hydatid cysts. Thus it fails just where its aid is most in demand.—*Jour A. M. A., May 23, 1903.*

Development of the Radiograph.

Dr. Geo. C. Johnson, Pittsburg, Pa., discusses the development of the photographic plate after exposure to the x-ray, giving detailed instructions, for which the reader is referred to the original paper in the *Journal of the Advanced Therapeutics* for May.

Chemical Effects of Canal Rays.—G. C. Schmidt (*Ann. d. Phys.*, November 11; abstracted in Lond. *Elec.*, November 14) gives an account of an experimental investigation in which he endeavored to find whether positive ions in gases exert an oxidizing action. This might be expected, as the negative electrons in kathode rays are known to have a strong reducing effect, which has been explained by the assumption that the negative electron satisfies a positive valency of the metallic atom, so that this acquires a lower valency than before. By an argument based on analogy, it might be expected that canal rays, which are assumed to consist of positive ions associated in some way with neutral atoms, would exert an oxidizing action; the author did not, however, find any well defined oxidizing action. There is powerful decomposition, but it depends upon the nature of the gas and the compound whether the decomposition results in an oxidation or in a reduction. Solid solutions which show luminescence under kathode rays show the same under canal rays, but it decreases rapidly owing to the decomposition, which is indicated "by the spectrum of the glow becoming whitish." If the gas in the tube is oxygen, and an oxidizable body is in it, the latter is oxidized; if, on the other hand, the gas is hydrogen, the latter reduces any compound capable of reduction. The most typical reaction for canal rays is the decomposition of sodium compounds; it takes place even when only traces of sodium are present, and is revealed by the *D* line.—*Electrical World and Engineer*, Dec. 13, 1902.

The X-Ray in Determining the Limits of the Frontal Sinus.

Dr. J. H. Philip, San Francisco (*Jour. A. M. A.*, March, 1902), made use of the radiograph to determine the position and size of the frontal sinus previous to operation thereon.

Electro-Therapy.

Electrolysis of Metallic Salts in Human Tissues.—This is accomplished by the polarization current—by the monopolar arrangement of electrodes. The body is immersed in a tub of acidulated warm water, which is insulated from every possible contact. The negative pole is connected with the metallic tub, at the patient's feet, being separated from the body by the intervening mass of water; the positive electrode is held in the patient's hand. In this way weak currents are approximately as available as strong ones since the resistance is greatly attenuated.

Clausin demonstrated that the voltaic current has the power of directing the course of the movements of molecules in whatever physical form they are found.

Arrhénius followed on this step by formulating his theory of ionisation of chemical solutions and the conductibility of electrolytics, making use of the discovery of Van't Hoff for the laws of osmotic pressure.

Dutrochet subsequently described an "subosmotic action" of the voltaic current, and Du Bois Raymond and Munk described their analogous conception by the incisive term "mechanical transportation." Gautier spoke of "interstitial electrolysis."

Electrolysis of the human body may prove of vast resource, altho with all its theoretic promise there are almost insurmountable barriers that confront us.—*St. Louis Courier of Medicine, Dec., 1902.*

[Evidently the writer of note does not know anything about electricity.]

Electricity as a Therapeutic Agent.

Dr. N. G. Burnham before the State Medical Society at Pueblo, Colo., Sept. 16, 1902, gave a general review of the application of electricity to cure disease. He emphasized its value to the physician in almost all forms of disease.

Interpretation of Electro-Therapeutic Results.—(Revue Internationale d'Electro-therapie et de Radiotherapie.) At the opening of the "French Association for the Advancement of Sciences," section of Medical Electricity, M. Bordier, chairman of the section, discoursed on this subject. You know, he says, that for some of our confreres electricity acts always by suggestion, and that it is necessary to invoke suggestion for every happy effect obtained, while others hold that when cures result they are due simply to nature's resolution toward recovery. After showing how, in many cases of nervous disease, physical influences could have played but an unimportant part, he seeks for other explanation, and finds it in a study of the neurones on the one hand and in the physiological action of electricity on the other. We know that the neurones connect the one with the other by kinds of articulations which are said to be the seat of amœboid movements, and that this connection is by contiguity rather than by continuity. The cause of certain paralyses is the breaking of this connection, by contiguity, of neuron with neuron, and it is especially this absence of contiguity that causes hysterical paralysis, as well as other functional nervous conditions. In order to again establish this contiguity—that is to say, in order to cure the paralysis which is the consequence of the abolition of the physiological function of the neuron, one cannot easily see what role suggestion can play if often invoked, nor comprehend how franklinization in the form of baths, or static breeze, or simple insulation can

act effectively. But whoever knows the laws of the propagation of the galvanic current, and he who has taken the pains to study the physiological action, and in particular the variable periods of this current, the explanation of the re-establishment of the nervous contiguity, offers no difficulty. The galvanic current is, in fact, the best in its action on the irritability of the nervous substance. In order to prove this, it is only necessary to recall that the brain and the nerves of special sense, to take no other example, react to the galvanic current and above all to its make and break with a remarkable promptitude, even when the intensity of the current is hardly appreciable. By these variable periods of opening and closing, this current is capable of producing an excitation of the neuron of the first order, and it is not surprising that under the influence of these repeated rhythmical excitations the terminals of the neurons suffer such modifications as to re-establish the normal contiguity. This is the interpretation of the results obtained by electric treatment in hysterical paralysis and other forms of the functional neuroses. The intelligence of the physician is thus much better satisfied than when one invokes the aid of suggestion as an explanation.—*The Clinical Reporter, Feb., 1903.*

Electricity in the Treatment of Metatarsalgia.—F. Piccinino says that it is a mistake to incriminate tight shoes alone as the cause of this painful affection, as it is frequently found in neurasthenic or gouty individuals, after much walking, bicycling, or riding. In some cases synovitis of the fourth metatarsal bone, tuberculous osteitis, and even a new bony growth have been found. Quite recently the author had occasion to treat a patient who for seven years had suffered from acute pain in the metatarsal region of the right foot; in the beginning it was intermittent and bearable, but it had of late become continuous and extremely painful. Having decided to try the effect of galvanism, the author applied it in the following way: a large, square electrode covered with chamois skin was placed on the lower third of the right thigh, anteriorly, while the positive electrode was introduced into a wooden tub filled with tepid water, into which the patient's foot was introduced. A current of 15 ma. was turned on and allowed to flow for ten minutes. On the following day the strength was increased to 20 ma. and the time to fifteen minutes. There was improvement from the start, and after the fifth application the pain ceased altogether at night, and in the daytime was less severe and appeared only after walking. A half cubic centimeter of a 2 per cent solution of cocain was injected for two days, the electrical treatment being continued. Two months have elapsed since the treatment, and as yet the patient has had no pain in the foot, which so tormented her for seven years.—*Annali di Elettricita Medica e Terapia Fisica,* December, 1902.

The Value of Linear Electrolysis in the Treatment of Strictures of the Urethra.—Moran (*Ann. des. Mal. des. Org. Genito-Urin.,* January, 1903).—With an unprejudiced mind the author has undertaken, thru experiment, to judge of the value of linear electrolysis as a treatment for strictures of the urethra, being forcibly impressed by the marked divergence of opinion among authors as to its efficiency. If one attempts to treat all strictures by this method he will get into serious difficulties, especially with those so hard, long or tight as to demand either a considerably intense current, or much force brought to bear upon the instrument. The following technique is advised:

The urethral stricture should measure

at least No. 10 (Charriere), if not, it should be dilated to this point. Use the usual cleansing precautions of the urethra and inject 1 per cent sol. cocain. Never employ a current of an intensity more than ten milliamperes. Never prolong the electrolytic action beyond some seconds, at most three minutes. Never force the instrument to penetrate into the urtehra, but simply delicately guide it. Return the blade of the electrolyzer upon the wall opposite to that which has been electrolized as the instrument passed in, thus utilizing the electrolytic action upon both walls of the urethra, and thus increasing its favorable action. If the stricture remains resistant under these conditions, employ internal urethrotomy.

Electrolysis does not produce a radical and definite cure of the strictures, but is, indeed, a simple, easy, painless and almost bloodless method of enlarging certain strictures, but does not take the place of subsequent dilatation to prevent recontraction. We should then not promise absolute cure to the patient. With the author electrolysis has been done easily, without the least accident, without the slightest febrile reaction, even in cases with genito-urinary tuberculosis, and with infected prostatics. Its advantages over internal urethrotomy (more acceptable to the patient, absence of pain and hemorrhage, uselessness of lying in bed and of the *catheter a demeure*, absence of grave complications) will cause linear electrolysis to supplant internal urethrotomy in many circumstances.—*Interstate Med. Journal.*

Does Newman's Galvano-Sound Necessarily Cauterize?

Replying to some criticism upon the use of this sound by C. S. Neiswanger, M. D., Dr. Robt. Newman in the *Electro-Therapeutist*, January, 1903, says that he never employed the actual cautery in any part of the urethra nor in hypertrophy of the prostate. He never cauterizes nor destroys the tissue in these cases. His instrument is intended to be used with one or several electric flashes, which cause no pain and do nothing more than produce a white film similar to the effect of silver nitrate in the treatment of granular urethritis. Used in this way the cautery acts first as a tonic and next as an astringent. The electro-cautery must be used severely enough to accomplish the object and no more. A bungling operator may cause destruction and cicatrices by means of electrolysis, but that does not prove that electrolysis with a mild current in the hands of an expert would be a failure. He has described in a text nine different methods for treatment of hypertrophy of the prostate. Of these he now prefers the method of slow flashes, and is opposed to rapid methods and to deep cauterization, such as the Bottini method.

The Prostatic Electrolyzer.

Dr. John V. Shoemaker, of Philadelphia, describes in the *Jour. Adv. Ther.* a convenient device for electrolytic treatment of the prostate gland. The instrument which he has used since 1890 consists of a J-shaped insulated electrode with a rectal sponge at the curved end. This sponge is passed into the rectum by the operator, who stands behind the patient. Hinged to the middle of the curved electrode is a longer insulated handle bearing on its anterior surface a sponge so situated that when the handle is brot forward between the legs of the patient the sponge presses upon the prostate. The electrical connections are made one at the outer end of the J-shaped electrode, the other at the extremity of the long handle. The current passes between the rectal sponge and the external prostatic sponge. Either direct or alternating current may be applied by this instrument, and the patient can easily make the application himself.

Electrical Apparatus and Its Application as a Therapeutic Agent.

Dr. N. L. Allen, of Boston (*Eclectic Medical Journal*, December, 1901), gave a review of electrical treatment and its results before the Massachusetts Eclectic Medical Society, giving a summary of the knowledge and opinions upon this subject which were then held by intelligent physicians, and advocating its much more extensive use in the treatment of disease.

Treatment of Neurasthenia—Dr. Daniel R. Brower, (*Jour. A. M. A.*) says regarding treatment: "Electricity is the third indication. I have no doubt about its great value. In the absolute-rest cases, of course, general faradism is necessary, and I direct that in the beginning of the treatment it should be very gently applied and to the extremities only; later, to the whole body, using currents that can just be felt. The skin should be gently stimulated and the various groups of muscles should be made to respond to mild currents. The bed cases should also receive galvanism, first to the head, using a descending current with large electrodes of from 1 to 3 milliamperes; then to the cervical sympathetic, using from 3 to 5 milliamperes, and then to the spine and abdominal sympathetic, with a large negative electrode at the epigastrium and a smaller one over the spine and a current of from 5 to 10 milliamperes. These seances should be given daily."

Static Electricity for the Insane.—Chase finds that the neurasthenic forms of mental ailment, such as melancholia, are decidedly benefited by the static breeze and spark directed to the spine or to various parts of the viscera. He reports cases which seem to have been benefited in this way. The remedy not only does good by its direct effects, but also thru suggestion. —*Jour A. M. A.*

Electro-Magnetism as a Healing Factor.

Carl Lillenfeld, of Berlin, describes in *Die Therapie der Gegenwart* an electromagnet excited by an alternating current which changes its polarity 100 times per second. Blood exposed to this alternating magnetic field becomes dark in a short time, and shows quicker consumption of oxygen. A considerable number (177) of neuroses, both peripheral, central and organic, were treated with this apparatus. More than half showed a decided improvement and 14 per cent were cured. The anodyne effect of the treatment was very marked.

The physical and therapeutic effects of a rapidly alternating magnetic field of high intensity are similar to those of the large high frequency coils, namely, increased metabolism thruout the tissues. Very little experimental work has as yet been done with this sort of apparatus, which will probably be found advantageous where the deeper tissues are affected. Pratt, Peterson, Kennelly and Herdman have previously tried experiments along this line, with varying success.

Treatment of Menorrhalgia by Electricity.

Dr. G. B. Massey, Philadelphia (*Jour. A. M. A.*, February 9, 1901), describes his treatment of this disease by mild mercuric kataphoresis, using an amalgamated zinc anode within the uterus, after reduction of the congested condition of the uterine appendages. If there is no endometritis he uses the positive electrode in the vagina only. He does not advise dilatation of the cervix for this condition.

Many of these painful conditions are relieved by a treatment simpler than the one recommended by Dr. Massey, namely, by the use of the sinusoidal current, placing the moistened electrodes upon the abdomen external to the ovaries.

Aneurism Cured by Electrolysis with an Introduced Wire. A. Bernheim, in *Deutsche Medicinische Wochenschrift* (Leipsic), August 16, describes a case of an extensive aneurism of the aorta cured with the introduction of fine gold wire and electrolysis. It is the fifteenth instance of this treatment on record, and is distinguished by the fact that the operation was repeated three times in a few months before the cure was permanent. Four of the fifteen cases were very much improved; five were cured, and all relieved by the intervention—results which should encourage its further application. In the experience reported nearly nine feet of a spirally coiled fine gold wire were inserted, and the anode applied, with the cathode on the back. A current of 10 to 80 milliamperes was turned progressively on and off during one hour. The sac slightly contracted and the pulsation diminished even before the operation was concluded. The results of the intervention were examined with an exploratory puncture two months later and about the same amount of wire introduced again, and half this amount thirty-nine days afterward. The patient was dismissed four weeks after the last intervention and has resumed his business as a commercial traveler.—*Jour. A. M. A.*

Currents of High Frequency in Dermatology.—Regner (*Progres Med.*, May 17, 1902) gives a summary of the employment of currents of high frequency in dermatology. The peculiar property of these currents is that, without producing any appreciable effect of contraction or sensation in muscles and nerves, they modify sensibility, reducing it to anesthesia. They also modify the circulation in a manner which has been described as circulatory drainage, which is beneficial in local inflammations with capillary and venous stasis, and in cases of impaired nutrition. Pruritus, often rebellious to other forms of treatment, is frequently improved by these currents. Psoriasis gives variable results. In eczema —especially weeping eczema—the effects are more constant, the itching sometimes disappearing after the first application. Alopecia, zona, molluscum contagiosum, acne, acne rosacea, impetigo, and morphoea have been favorably influenced. Lupus erythematosus may be cured by this method, which appears to be more rapid than phototherapy. The effect in cases of tuberculous lupus is a matter of controversy. The author is of opinion that the method may be used as an adjunct to the light treatment. He states that the effect is partly due to the liberation of ozone. He concludes that high frequency currents are a valuable addition to the therapeutics of a certain number of dermatoses.—*Br. Med. Jour.*, February 7, 1903.

Rheumatoid Arthritis.

Dr. F. A. Bishop, Washington, D. C., read a paper before the American Electro-Therapeutic Association in September last year, in which he said rheumatoid arthritis would become a thing of the past if habit and diet could be corrected. The disease is curable, even in advanced stages, and electricity combined with diet is the only agent that can be relied upon for cure. When cartilage has been destroyed it can not, of course, be regenerated, but the muscles, the skin and the glands can be made to resume healthy action, and joints that have not been too far disorganized can be made to work properly. The limbs can be straightened, the pain relieved, and the patients enabled to resume their ordinary occupations. For diet he recommends beef or mutton; very little bread; milk, eggs and water in abundance. The electrical treatment advised is static sparks to the joints, nerves and the skin. For joint effusion he applies a gal-

vanic negative electrode to the boggy surface until a good sized blister is produced. This is repeated from time to time. The extensor muscles are treated by the faradic and the interrupted galvanic current, applying the hands (for example) to the negative electrode, with a large positive pad over the spine. Very little medicine is given. Some cases are described illustrating the treatment. Dr. Skinner also had found electricity extremely useful for this disease, and had found the dry hot air body treatment a valuable adjunct, tho local hot air treatment was useless.

Treatment of Urethral and Esophageal Strictures by Linear Electrolysis.—Dr. J. A. Fort, of Paris, presented an exhaustive communication on the subject, giving in extenso the history of fifty cases. These were divided into two groups: the seventeen cases in the first group were seen between 1889 and 1902 inclusive, the thirty-three in the second group were treated during the present year. In the first group were five cases of stenosis of the esophagus and twelve of urethral stricture, four of the latter being complicated by gleet; all were cured. The second group comprised twenty-three cases of simple urethral stricture, eight of urethral stricture complicated by gleet, and two of esophageal stenosis; of the latter one was cured, in the other a cancerous stricture, there was such marked improvement that it was possible for the patient again to take nourishment in the natural way. The urethral strictures were all relieved, but in some cases the patients pased from under observation before sufficient time had elapsed to warrant the assertion that a definite cure had resulted. From his experience with these and many other previously reported cases, the author felt himself justified in concluding that linear electrolysis was preferable to internal urethrotomy in the treatment of urethral stricture and to gastrotomy in that of stricture of the esophagus, provided, of course, that the latter was not absolutely impassable.—*Med. Record,* May 23, 1903.

The Use and Abuse of High-Frequency Electricity in Medicine.—H. Lewis Jones concludes from a study of Denoyé's book on the subject, that high-frequency treatment possesses an influence upon the course of a certain number of morbid states, that its influence for good is not of any particular degree of excellence, but that it can not be condemned as altogether useless. In the field of general diseases dependent upon impaired or perverted nutrition it has proved decidedly disappointing, although it was in this class of case that great things were formerly expected and predicted from the physiological effects. In diseases of the skin high-frequency applications appear at their best. Psoriasis, eczema, alopecia areata, lupus vulgaris, acne vulgaris, and impetigo all seem to be decidedly benefited by direct applications of the high-brush discharge or of sparks. Evidence of a trustworthy kind is accumulating to show that morbid growths such as sarcoma, carcinoma, etc., are favorably affected by this treatment, and also with the static-brush treatment. The method appears to be inferior to treatment by the Roentgen rays, but to be of the same essential character.—*The Practitioner,* March, 1903.

Treatment of Varicocele.

Dr. C. S. Neiswanger in the Alkaloidal *Clinic* describes at some length the treatment of varicocele by the positive electrode, galvanic current. He also states that x-ray dermatitis is caused by kathode rays and not by x-rays, and may be prevented by wrapping a black cloth around the tube; an opinion with which we can hardly agree.

Electrolysis in Skin Diseases.—Wisecup describes the methods employed by him for removal of superfluous hair and other conditions. On account of the variations of individual resistance he does not think the milliampere meter necessary, and advises the use of the smallest possible needle, not too sharp at the point; for the other electrode he allows the patient to hold his fingers in a cup of water, connected with the other pole. The rule he follows is to insert the needle about one-fourth of an inch into the average hair follicle, but a smaller distance for smaller hairs. Aim to have the needle come in contact with the hair bulb, which can be told by the slight resistance met. Leave the needle inserted until a white froth bubbles around it, but there is danger of leaving it too long and a scab or scar forming. Use preferably a straight needle, as small as possible, without a bulb. Among the diseases which he has treated are nevus, tho the common birthmark is unsatisfactory under this head; also moles, cavernous nevus, dilated vessels, cicatricial scar tissue, xanthoma and blackheads.—*Jour. A. M. A.*

Chemical Electrolysis in Hypertrichosis.—Instead of the tedious intrafollicular electrolysis, Weil applies the electricity all over the surface, first pulling out the hairs and moistening the surface with a solution of nitrate of silver or of chromic acid. Under the influence of the electricity, the kations, the silver and chromin, pass into the follicles and, combining with the chlorin of the tissues, evidently form an insoluble silver chlorid which prevents further growth of the hairs. Experiments on himself showed that the destruction of the hairs on the spots treated was complete. — *Bulletin d' Electrotherapie* (Paris), April.

Electric Treatment of Mucomembranous Enterocolitis. E. Doumer.—The writer of this communication has been very successful with the application of the continuous current in the treatment of mucomembranous enterocolitis. The obstinate constipation was conquered at first, and this was followed by the gradual healing of the anatomic lesions and subsidence of all symptoms. The current was applied commencing with 30 to 40 ma. and increasing to 50, during eight or ten minutes, reversing the current each minute. Even when the current was increased to 150 ma. the patient bore it without the slightest injury or production of an eschar. Until the stools become normal, which occurs in ten or twelve days, he repeats the treatment every day, but after this at longer intervals, and discontinues it the twentieth to the twenty-fifth day. The electrodes are covered with several thicknesses of chamois skin, moistened with water or gelatin, and placed at the lowest point of the iliac fossæ. The results in all his seven cases were completely successful.—*Nord Medical (Lille)*, May 15.

Static Electricity in the Treatment and Cure of Varicocele.

Drs. J. G. Carroll and B. T. Boyd *(Alkaloidal Clinic)* have found the positive galvanic electrode useful in most cases of varicocele. In extreme cases of long standing they found static electricity (positive electrode) very beneficial in stimulating tissue changes. The negative pole was grounded, the patient placed on the insulating stand and a spark gap of three or four inches made between the positive pole of the machine and its electrode which was in contact with the scrotum.

Radio-Therapy.

Radio-Therapy.

Dr. Wm. J. Morton read a paper on the treatment of malignant growths by the x-ray at the meeting of the Harvard Medical Society of New York City, Feb. 22, 1902, in which he gave a report of a number of cases then under treatment. A sarcoma at the elbow joint was relieved of pain by the first treatment. After two months, treatment being given three times a week, the cure seemed to be complete. A carcinoma of the breast of five years' standing, recurrent, with an enlarged gland in the axilla was perceptibly improving after four treatments. A patient having cancerous tumor of the stomach was relieved of pain by each treatment for from 6 to 48 hours. After six treatments she has remained three successive days without pain, which before treatment began was constant. A case of sarcoma of the side of the head, which began four years before, had been excised and later treated with caustic. It was somewhat relieved by the use of Dr. Coley's serum, but afterwards grew rapidly, causing intense pain which necessitated the use of one-half a grain of morphia every two or three hours. After the third treatment no morphia was required at night. In one month the tumor was nearly all gone and the patient entirely free from pain. Several other cases of marked improvement under the x-ray were described in the paper.

Dr. Morton calls particular attention to the immediate and complete relief from pain in these cases. This he considers to be due to the benumbing of the nerves of sensation by the x-ray. This innervation he thinks may cause a reduction of the activity of the growth of the part. When the new growth has an open ulcer he would use the rays with such intensity that their action would resemble that of the caustic, but where the skin is not destroyed it should be guarded carefully. A great advantage in the use of the x-ray is its power of reaching foci of disease which may be deeply situated, destroying infections in parts where the knife could not be used. "It is necessary to emphasize the great caution required to administer enough of the x-ray, without burning or injuring to the extent of gangrene the patient's tissue, and yet enough to cause retrogression of the new growth. The treatment is a hazardous journey between Scylla and Charybdis."

The Therapy of Light.

The use of light in the treatment of disease is increasing in about the same ratio as new machines are invented. The x-ray is still very much in evidence, although not carried to the same extremes as in former months. There are many advocates who believe in the efficacy of x-rays for all forms of malignant growths, and are demonstrating, to their own satisfaction at least, its curative powers.

The conservative experimenter is the man who, by clinical results, is recording his failures and triumphs. He is conservative enough to state that improvements have taken place in many cases while in others the result is still in doubt. The advantage of the x-rays over other forms of light, is its power of penetrating the body, thus reaching the deep structures and modifying bacterial toxins or changing and suspending the activity of disease stimuli. The apparent results obtained in malignant disease is still a matter for consideration and speculation, and altho many seeming recoveries are recorded, time will determine the ultimate disappearance of growth and the recovery from disease. If the rays have the power of deep penetration, and are applied to the

various portions of the body where malignancy may be transmitted, i. e., in the glandular structures, then may we seriously consider its curative power. Unfortunately, the x-rays are not infallible; shadows from a distant organ may appear on the photographed plate and deceive one as to the exact position of the lesion. One instance detailed by one of the leading surgeons of the state is an illustration of x-ray error. A patient with symptoms of renal calculus was advised to have an x-ray picture made by an expert. The plate showed very plainly a shadow in a kidney that was thought to be a stone. An operation followed, but no stone was found. Numerous instances similar in their findings have led some courts to exclude x-ray photographs from the evidence in the cases in which damages for needless operations have been sought, yet it is well known that metallic substances and fractured bones have been accurately defined by the x-ray.

The possibility of burns from prolonged or repeated exposures has led the manufacturers of apparatus to provide suitable shields to protect the body, and to compass the rays. These shields are invaluable, and should form a part of every outfit.—*Northwestern Lancet.*

Red Light Treatment for Small-Pox.

Dr. J. F. Schamberg, of Philadelphia, in the *Jour. A. M. A.*, May 2, 1903, examines critically N. R. Finsen's treatment for smallpox by exposure to red light only. He says that the treatment is not new, having been employed as early as the 14th century, and gives good reasons for doubting Finsen's theory that ordinary light affects the smallpox patient injuriously. In his own experience the red light treatment failed completely to produce any marked result. Many mild cases leave practically no scars under any reasonable treatment and if the red light happens to be used in these cases enthusiasts are liable to attribute the absence of scars to the red light.

Photo-Therapy.

Dr. F. H. Montgomery read a paper on this subject before the Chicago Medical Society, giving a tabulated report of 800 cases of lupus vulgaris treated at the Finsen Light Institute, Copenhagen. About 70 per cent of the cases are reported cured, with recurrences in about 20 per cent, due mainly to reinfection of the skin from mucous membranes. Of the remaining 30 per cent all but 2 per cent or 3 per cent have been benefited. The treatment requires the constant attention of a trained assistant and requires exposures of an hour each to a single area. Lamps with iron electrodes have remarkable bactericidal power, but the rays do not penetrate below the epidermis. The histological changes are those of simple inflammation. Dr. Montgomery thinks photo-therapy is the best treatment for all tuberculous lesions of the face, as well as in some cases of lupus erythematosus, alopecia areta, rosacea, vascular nevi, superficial epitheliomata, and indolent ulcers.

A Brief History of the Therapy of Various Forms of Light and Radiotherapy.—James M. Winfield, in the *Brooklyn Medical Journal* for April, reports briefly some of his own experience with the x-rays. He holds that the Finsen method is of undoubted value though limited in its scope, and that radiotherapy is more useful than phototherapy because of its wider range of application. It is better in lupus than the Finsen light because of its simplicity, and it is of value in almost all forms of cancer, but surgical procedure is preferable if the cancer is small and easy of access. Radiotherapy should be used in inoperable cancer and after removal by surgical means.

Medico-Legal.

Physical Examination—Privilege Extends to Skiagraph.—The malpractice case of Aspy vs. Botkins, as it is entitled in the supreme court of Indiana, was brought by the latter party to recover for alleged negligence in the treatment of an injury which she had received in and about her right knee. While the physician sued was on his case in chief, and one of his attorneys was examining a physician and surgeon called as a witness in his behalf, such attorney made the request that the witness be allowed to examine the knee in the presence of the jury, that he might testify as to the condition of the knee at that time. Objection was made to the granting of this request, and the trial court refused to so order. This leads the supreme court to say that where the ends of justice require it, it is the duty of the court, on a timely application, to grant a reasonable request to have the party suing in a personal injury case, on the penalty of a nonsuit, submit to a physical examination with reference to the injury he claims to have sustained. The right is not, however, coextensive with the power of cross-examination, and some latitude of discretion must be recognized as existing in the trial court. Each case must rest on its own foundation, and the party sued who complains, on appeal, that the trial court abused its discretion in refusing to make the order, must be able to present a case where it is plain that the request should have been granted. The supreme court is satisfied that error did not appear in the present instance, for the reason, if for no other, that it required the party suing, a woman, to make a quasi public exposure of her person. That she subsequently offered to exhibit her limb to the jury did not operate to make the prior ruling improper. Again, while the physician was introducing evidence on his own behalf, his counsel called the party suing to the stand and asked her whether a certain other physician had taken an x-ray photograph or skiagraph of her right knee. Objection was made to the question, and it was shown that whatever such other physician had done in relation to the knee had been done in treating the limb. The supreme court says that, in terms, the Indiana statute only purports to render the physician or surgeon an incompetent witness as to the matters therein specified, but it is evident that the protection would amount to nothing, in the case of an honest suitor, if the latter could be compelled to make the disclosure. It is hardly necessary to observe that, if the consultation was itself protected, a like protection would extend to the mute voucher thereof. —*Jour. A. M. A.*

Damages for X-Ray.—The Paris lower court has recently condemned a physician to 5000 francs damages and expenses, on account of a severe x-ray burn that developed on a patient after three long exposures in the course of three weeks. The *Semaine Méd.* commends that physicians must bear in mind that when they apply these new physical therapeutics they step out of the domain of medicine and pass into the jurisdiction of common law. According to this French decision, a fault or negligence is not necessary—the mere application of physical measures which resulted in injury renders the physician liable to damages. The editorial concludes with the remark that justice, as practiced in the courts, is not partial to the medical corps in these days, and it behooves physicians to be wary.—*Jour A. M. A.*

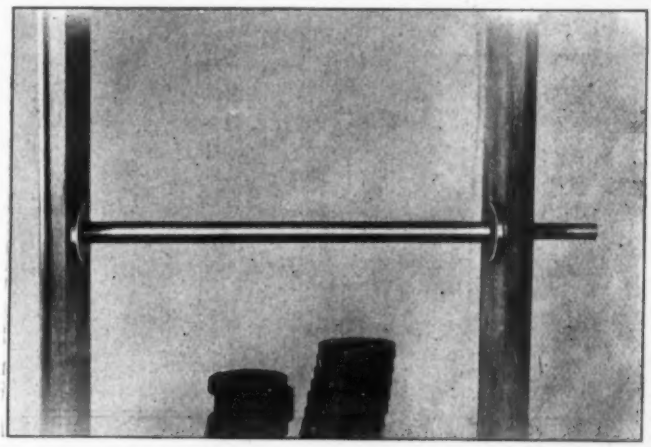
Correspondence.

BUFFALO, N. Y., July 8, 1903.

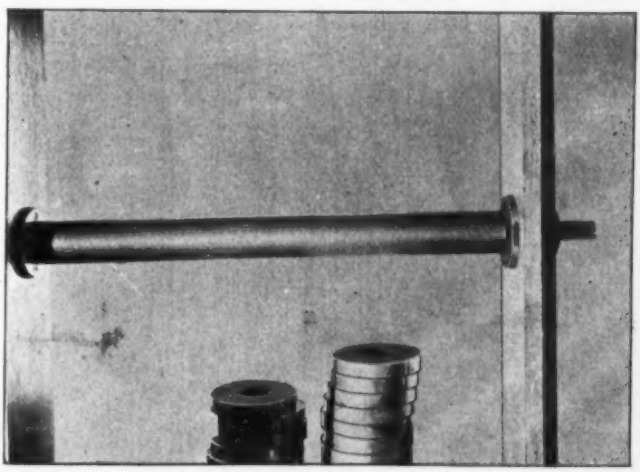
DEAR DOCTOR:

In building three new static machines for my own use to be operated in multiple relation to each other on a single low vacuum tube, the following manner of construction is being utilized:

Cut No. 1 shows naked steel axle in situ; also the flanges of its plain brass boxes and wood upright supports.



Cut No. 1.



Cut No. 2.

Cut No. 2 shows the same axle covered from flange to flange with a hard rubber sleeve half an inch thick. A fine thread runs the entire length of the sleeve to receive the hard rubber collars similiary threaded. The sleeve was shrunk firmly upon the axle at the hard rubber factory. Hard rubber collars are six inches in diameter.

Cut No. 3. The hard rubber collars, narrow and wide, are seen to alternate with each other; soft rubber packing is also shown interposed between them.

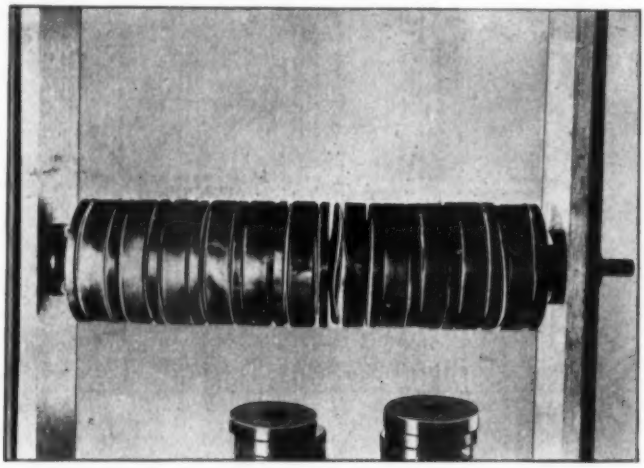
The cost of the hard rubber all made up and accurately fitted, first quality, as appears in cuts, is fifty dollars per machine.

Twenty revolving plates will be operated in each case, altho the inside measurement is but twenty-three inches.

Owing to the perfect insulation of the shaft nearly all of that portion of the glass wheels which project beyond the rubber collar can be utilized in the generation of electricity.

Collecting rods will be proportionately long, projecting well towards the axle, but made movable, so they can be withdrawn therefrom as the resistance of the x-ray tube increases. When wooden collars are employed or the shaft is not incased as shown above, the collecting combs must be shorter, and more of the area of the revolving plates remain electrically inactive. Yours sincerely,

JOHN T. PITKIN.



Cut No. 3.

LONDON, ENG.

DEAR SIR:

As you have so kindly been sending me your brightly edited journal, I take the liberty of enclosing a short article in case you think it good enough for publication. I do not think you, in America, have yet come to realize the wonderful results obtainable from the high frequency currents. They are all the rage at the present time in France, and are fast becoming fashionable here, also. In Germany, however, I am told that there is a reaction in favor of x-rays.

The great advantage of the high frequency treatment is its freedom from danger and the impossibility of producing burns and other after effects.

Yours fraternally,
H. VALENTINE KNAGGS.

[We are glad to publish the article, for we think Dr. Knaggs' ideas are worthy of study.—ED.]

DEAR DOCTOR:

I will thank you for advice as to how I can bring life into my static machine, this very wet weather. It stopped giving a current a few days ago. Connections are all right as far as I am able to see. I have placed ten pounds freshly baked clorid of calcium in the case with no result. I once tried ice with no better result. Any advice you may see fit to give me soon, I assure you will be much appreciated. Fraternally yours,

S. J.

[If the mechanical parts of your static machine are in good order, the brushes touching the knobs as they pass, and the air in the machine dry, it is probable that the surface of the plates, of the inside of the case, or of both, is for some reason a conductor. The ozone generated whenever the machine is in action forms oxids of nitrogen and these unite with any moisture that may be present to form nitrous and nitric acids which condense upon the surface of the plates

and render them conductors. When these acids are once formed they can not be removed by a drying material such as calcium chlorid. Particles of dust or of cotton may also adhere to the surface of the plates and render them partial conductors. Try washing the plates and the whole inner surface of your machine, especially the rubber insulators and supports, with a cloth wrung out of weak ammonia water; then rub lightly with a clean dry cloth. Air well and remove the remaining moisture by placing in the machine two or three pint jars filled with a freezing mixture (snow or pounded ice two parts, salt one part). In fifteen to thirty minutes the machine should be dry enough to work. Then remove the jars, putting in their place an open dish containing a pound or more of pure calcium chlorid. If the shellac is detached on any portion of the plates it is much harder to keep them clean and dry and a fresh coat should be applied.—EDITOR.]

Crystallization from an Electrolyte.—Heyl (*Phys. Rev.*, December) gives an account of an experimental investigation. Having failed to find any effect produced by electrostatic stress upon crystals formed under its influence, he investigated the effect produced upon crystals formed from an electrolyte carrying a current. The results are likewise entirely negative. Two substances were used: copper sulfate in an aqueous solution and mercuric iodid in concentrated hot hydrochloric acid. The passage of the current produces no effect comparable with that produced by the heating of the solution.—*Electrical World and Engineer*, January 10, 1903.

A Resume of Photo-Therapy.

Dr. Otto Juettner in the *Electro-Therapeutist* for May gives the substance of a class lecture upon this subject. No new facts are given.

BRADFORD, PA., July 14, 1903.

GENTLEMEN:

I wish to report an accident which occurred yesterday in my office:

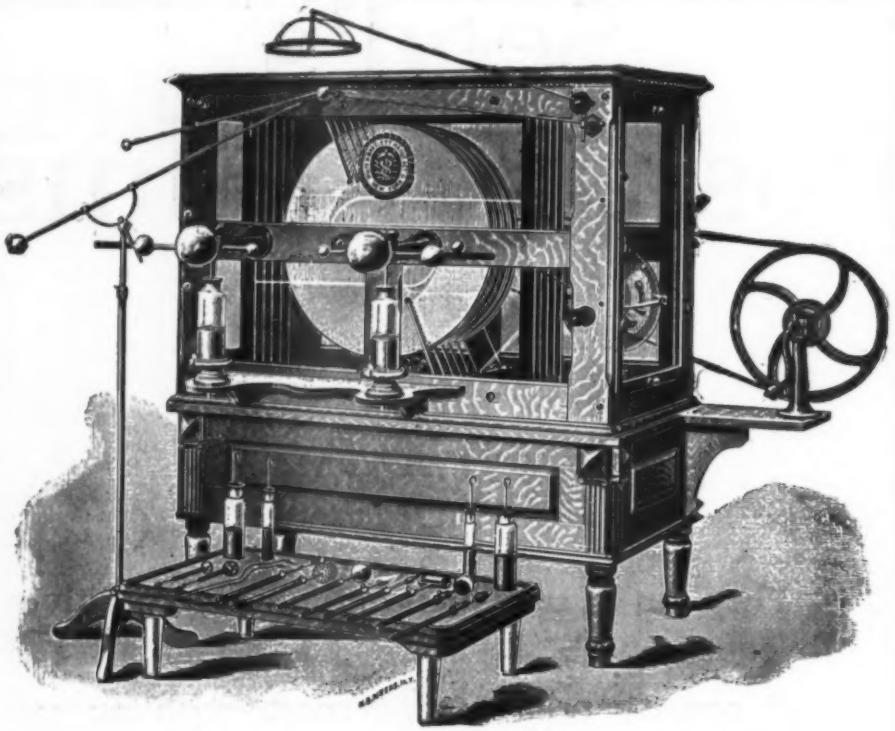
About 2:30 p. m., a Crookes tube collapsed in my hand, the flying glass cutting hand terribly; particles of glass also struck me in the face and making a few cuts. A patient awaiting treatment standing a few feet off, also received a few cuts from the flying glass.

The tube was the "Monell" type, and had done excellent service for a year. A week ago it backed up a spark gap of 4 inches from a 12-plate Holz machine. The bulb was not blackened, as is often the case when a tube is "high," and has seen considerable service. Heat, or other methods employed in manipulating tubes for special purposes, had never been used on this tube. The tube was taken out of a closet where all my tubes are kept lying on cotton batting. I carefully picked it up by the handle, and as I was walking across the floor to place it in the tube holder, it collapsed. The explosion from it was as loud as a cannon cracker. The temperature of the room was 87°, with no draughts of cold air striking it. I am positive that my hand did not come in contact with it nor did the tube strike any surrounding object.

Fortunately the cuts made by the glass were not deep, tho they were many, and at this writing are such that I have left off all gauze dressings. I am not aware of any cases where any serious results followed such accidents, but I can imagine that the results might be disastrous if this occurred when raying the face if the patient were close to the tube.

Yours very truly,

J. W. KING.



WASHINGTON, D. C., January 21, 1902.

DR. HENRY E. WAITE, Pres. Waite & Bartlett Mfg. Co.

DEAR DOCTOR:—After three months of capable, unprejudiced, exhaustive labor and research, the authorities at the Barnes Hospital, U. S. Soldiers' Home, Washington, D C., have given us an order for the Waite & Bartlett Mfg. Co. Static Electrical Machine and X-Ray Outfit which has been on trial there in competition with the Van Houten & Ten Broeck's (Otis, Clapp & Co.) apparatus.

Crucial tests, which are absolutely impartial, were made during the period the machines were on trial, because it was the purpose of those in charge of the matter to buy the best apparatus obtainable.

Simultaneously with that trial, another investigation was in progress at the Children's Hospital in this city, where the same makes of apparatus were in full operation, and this institution also concluded that the Waite & Bartlett Mfg.Co. equipment was the best, and we likewise received their order for the complete outfit.

These orders are the outcome of painstaking investigation, and the victory of the Waite & Bartlett Mfg. Co. in both cases is one to be proud of, for their apparatus is thus stamped as the best now in the market, both for therapeutic purposes and X-Ray work.

Another fact to prove the excellence of the Waite & Bartlett Mfg. Co.'s apparatus is that there have been eleven of their Static Machines sold recently in Washington, the purchasers being as follows:

The U. S. Senate.
Dr. F. E. Gibson.
Dr. Robt. Reyburn.
Dr. H. H. Hawxhurst.
The Children's Hospital.
The U. S. House of Representatives.
Dr. F. A. Gardner (two outfits).
Dr. C. H. Heron.
Dr. H. Krogstad.
The Barnes Hospital, U. S. Soldiers' Home.

Yours very truly, Z. D. GILMAN.

N. B.—This is a copy of letter received by us from our agent at Washington, which speaks for itself. Yours truly,

WAITE & BARTLETT MANUFACTURING CO.

217 East Twenty-Third Street **NEW YORK.**

SEND FOR CATALOGUE